Vol. 87, Sect. 14, 1950

# **PROTOCHORDATA**

COMPILED BY

M. BURTON, D.Sc.

PRINTED FOR THE ZOOLOGICAL SOCIETY OF LONDON SOLD AT THEIR HOUSE IN REGENT'S PARK LONDON, N.W.8.

PRICE TWO SHILLINGS
October, 1952

# SEPARATE SECTIONS OF THE ZOOLOGICAL RECORD

In addition to the complete bound volume, the separate Sections may be obtained singly, bound in printed paper covers.

The following are the Sections and their prices, viz.:-

								8.	d.
1.	Comprehens	ive Zoo	ology			•••	•••	2	6
2.	Protozoa							7	6
3.	Porifera						•••	2	0
4.	Coelenterata	a.	•••					4	0
5.	Echinoderm	a.						2	6
6.	Vermes	• • •						10	0
7.	Brachiopoda	ì		è «/«	• • •			3	0
8.	Bryozoa		•••					2	0
9.	Mollusca					•••		10	0
10.	Crustacea							5	0
11.	Trilobita				•••	4		3	0
12.	Arachnida							7	6
*13.	Insecta	•••						30	0
14.	Protochorda	ta				700		2	0
15.	Pisces							7	0
16.	Amphibia ar	nd Rep	tilia					7	6
17.	Aves	• • •						7	6
18.	Mammalia							17	6
19.	List of New	Genera	and S	ubgene	era			3	0

<sup>\*</sup> Obtainable only from the Commonwealth Institute of Entomology, 41, Queen's Gate, London, S.W.7.

# 14. PROTOCHORDATA

INCLUDING

## ENTEROPNEUSTA AND PTEROBRANCHIA

BY

### M. BURTON, D.Sc.

#### I.—TITLES

- 1.—Abrard, R., Dollfuss, R. P., and Soyer, R. Tubes silicifiés présumés de Cephalodiscus, dans le Lutétien lagunaire de la région parissiene. Bull. Soc. géol. Fr. (5) 20 (1-3) 1950 pp. 51-55 pl. III.
- 2.—Allan, F. E. & Wood, E. J. F. Investigations of underwater fouling. II. The biology of fouling in Australia: results of a year's research. Aust. J. Mar. Freshwater Res. 1 1950 [Tunicates p. 103].
- 3.—Ärnbäck-Christie-Linde, A. On the situation of the heart in *Tylobran-chion*. Ann. Mag. nat. Hist. (12) 3 1950 pp. 977-981, 1 fig.

Baeri, E. see Califano, L.

- 4.—Baldwin, E. & Yudkin, W. H. The annelid phosphagen with a note on phosphagen in Echinodermata and Protochordata. Proc. roy. Soc. London 130B (885) 1950. [Protochordates pp. 624-628].
- 5.—Behre, E. H. Annotated list of the fauna of the Grand Isle region. Occas. Pap. mar. Lab. Baton Rouge, La. 6 1950. [Tunicates p. 38].
- 6.—Belayev, G. M. Normal indicators of the osmotic pressure in the coelometic liquid of the invertebrates in Barents Sea. C.R. Acad. Sci. Moscou N.S. 1950 71 (3) pp. 569-572. [In Russian].
- 7.—Bemmelen, J. F. van. Segmentatie. Proc. K. ned. Akad. Wet. Amsterdam 52 8 1949 pp. 819–828 [English, French & German résumés pp. 826–8].

- 8.—Berrill, N. J. Budding in Pyrosoma. J. Morph., Philadelphia 87 1950 pp. 537-552 3 figs.
- 9.—Berrill, N. J. Budding and development in Salpa. J. Morph., Philadelphia 87 1950 pp. 553-606 7 figs.
- 10.—Berrill, N. J. The Tunicata, with an account of the British species. Ray Society London 1950 iii + 354 pp. 120 figs.
- 11.—Bertrand, D. Survey of contemporary knowledge of biogeochemistry. 2. The biogeochemistry of vanadium. Bull. Amer. Mus. nat. Hist. 94 1950 pp. 403–455 tables.
- 12.—Bourdillon, A. Note sur la commensalisme des *Modiolaria* et des Ascidies. Vie et Milieu, Paris, 1 1950 pp. 198-199.
- 13.—Breede, P. van den. Le role des epicardes dans le bourgeonnement des Didemnidae. Ann. Soc. zool. Belg. 79 1949 pp. 37-62, 18 figs.
- 14.—Brewin, B. I. Ascidians of New Zealand.—Part IV. Ascidians in the vicinity of Christchurch. Part V. Ascidians from the East Coast of Great Barrier Island. Trans. roy. Soc. N.Z. 78 1950 pp. 344–362 12 figs.
- 15.—Brien, P. Potentialités totales, potentialités restreintes mais correlatives d'une même ébauche, a propos de la regénération de l'epicarde des Tuniciers. C.R. 13e Congr. int. Zool. Paris 1948 [1949] pp. 259-260.
- 16.—Brien, P. & Breede, P. van den. Le rôle des Épicardes dans le bourgeonnement des *Didemnidae*. C.R. 13e Congr. int. Zool. Paris 1948 [1949] pp. 460-461.

- 17.—Burdon-Jones, C. An Enteropneust genus new to the British Isles. Nature, Lond. 165 1950 p. 327.
- 18.—Califano, L. & Baeri, E. Studies on haemovanadin. III. Some physiological properties of haemovanadin, the vanadium compound of the blood of *Phallusia mamillata* Cuv. J. exp. Biol. 27 1950 pp. 253–256.
- 19.—Califano, L. & Caselli, P. Ricerche sulla Emovanadina. II. Analisi spettrofotometrica. Pubbl. Staz. zool. Napoli 22 1950 pp. 138–145 6 figs.

Calvin, J. see Ricketts, E. F.

- 20.—Carlisle, D. B. Alcune ozzervazioni sulla meccanica dell'alimentazione della Salpa. Pubbl. Staz. zool. Napoli 22 (2) 1950 pp. 1–9 3 figs.
- 21.—Carlisle, D. B. Una localizzazione più esatta del principio cromatoforotropico della regione neurale della Ciona intestinalis. Pubbl. Staz. zool. Napoli 22 1950 pp. 192–199 1 fig.

Carvalho, J. de P. see Sawaya, P.

Caselli, P. see Califano, L.

- 22.—Chacko, P. I. Marine plankton from waters around the Krusadai Island. Proc. Indian Acad. Sci. 31 (3) 1950. [Protochordates p. 169].
- 23.—Colombo, G. Alcune osservazioni sulla maturazione, fecondazione e segmentazione di uova di *Ascidia malaca* (Traustedt), normali e colchicinizzate. Arch. zool. Torino 33 1948 pp. 429–441 4 figs.
- 24.—Colwin, A. L. & Colwin, L. H. The developmental capacities of separated early blastomeres of an enteropneust, Saccoglossus kowalevskii. J. exp. Zool. 115 1950 pp. 263–295, 71 figs.
- 25.—Dalcq, A. La génèse du complexe inducteur chez les Chordés. Rev. suisse Zool. 57 1950 Suppl. 1. [Protochordates pp. 13–14].

Davis, C. C. see Smith, F. G. W.

- 26.—Dennell, R. Note on the feeding of Amphioxus (*Branchiostoma bermudae*). Proc. roy. Soc. Edinb. 64 1950 pp. 229–234 2 text-figs.
- 27.—Dieuzeide, R. La faune du fond chalutable de la Baie de Castiglione, Bull. Sta. Aquic. Pêche Castiglione (N.S.) 2 1950. [Protochordates p. 53].

28.—Dolgopolskaia, M. A. Das Zooplankton des Schwarzen Meeres in der Nähe von Karadag. [Russian with German summary]. Trav. Sta. biol. Karadagh No. 6 1940. [Protochordates pp. 95–6].

Dollfuss, R. P. see Abrard, R.

- 29.—Faure, M.-L. Note préliminaire sur le Zooplancton de la Zone côtière du Maroc (Année 1947). Rapp. Cons. Explor. Mer. Copenh. 126 1950 pp. 44-51, 8 figs.
- 30.—Fischer-Piette, E. & Gaillard, J.-M. Sur l'écologie du tunicier *Pyura sariguyi* Philippi dans la zone des marées Bull. Lab. marit. Dinard No. 33 1950 pp. 20–23.
- 31.—Fischer-Piette, E. & Gaillard, J.-M. Les conséquences de la sécheresse de 1949 sur la pénétration des espèces marines dans la Rana. Bull. Lab. marit. Dinard No. 33 1950 pp. 25–27.
- 32.—Fouque, G. Relations entre la structure de l'intestin et la structure de la glande pylorique chez Botryllus schlosseri Pallas. Bull. Inst. océanogr. Monaco No. 954 1949 pp. 1–9 4 figs.
- **33.**—Fraser, J. H. The distribution of Thaliacea (Salps and Doliolids) in Scottish waters 1920 to 1939. Sci. Invest. Fish. Scotl. **1949** No. 1 pp. 1–44 16 figs. 4 tabs.

Gaillard, J.-M. see Fischer-Piette, E.

- **34.**—**Geidies,** H. Mikroskopische Technik der Pigmentaugen wirbelloser Tiere. Mikrokosmos, Stuttgart **39** (9) 1950 pp. 200–203.
- 35.—Goodbody, I. M. Notes on Tunicata from Dublin Bay. Irish Nat. J. 10 (3) 1950 pp. 77–80.
- 36.—Haywood, C. A. & Moon, H. P. The mechanics of the blood vascular system of *Ascidiella aspersa*. J. exp. Biol. 27 1950 pp. 14–28 10 figs.
- 37.—Hirai, E. The early development of *Cynthia roretzi*. Sci. Rep. Tôhoku Univ. (4) Biol. **16** (2) 1941 pp. 217–232 8 figs.
- **38.**—**Hirai**, E. An outline of the development of *Cynthia roretzi* Drasche Sci. Rep. Tôhoku Univ. (4) Biol. **16** (3) 1941 pp. 257–261 2 pls.

- 39.—Indelli, E. Contributo alla conoscenza della fauna bentonica costiera del Golfo di Napoli. Acta pont. Acad. Scient. 10 (19) 1946. [Tunicates p. 211].
- 40.—Jacobi, L. Morphologie und Anatomie des Enteropneusten Sacco-glossus pygmaeus Hinr. & Jac. Helgol. wiss. Meeresuntersuch. 2 1941, pp. 163–182, 28 figs.
- 41.—Kobayashi, S. On the occurrence of the acid reaction in the body tissues of an ascidian, *Ascidia samea* Oka. Sci. Rep. Tôhoku Univ. (4) Biol. 15 (4) 1940 pp. 357-367 1 table.
- 42.—Kobayashi, J. On the presence of vanadium in certain Pacific ascidians. Sci. Rep. Tôhoku Univ. (4) 18 (2) 1949 pp. 185-193 figs.
- 43.—Kuriyan, G. K. On the occurrence of Enteropneust in Shingle Island, Gulf of Manaar. Current Sci., Bangalore 18 (7) 1949 p. 258.
- 44.—Kuriyan, K. The fouling organisms of pearl oyster cages. J. Bombay nat. Hist. Soc. 49 (1) 1950. [Tunicates p. 92].
- **45.—Marcus,** E. du B.-R. *Phoronis ovalis* from Brazil. Bol. Fac. Philos. Sci. Univ. S. Paulo Zool. **14** 1949 pp. 157–166 3 pls.
- 46.—Millar, R. H. Lissoclinum argyllense n. sp., a new ascidian from Scotland. J. Mar. biol. Ass., Plymouth 29 (2) 1950 pp. 389–392 1 fig.
- 47.—Minganti, A. Esperimenti di ibridazione interspecifica nelle Ascidie. Pubbl. Staz. zool. Napoli 22 (3) 1950 pp. 293–307 6 figs.
- 48.—Minganti, A. Ibridazioni interspecifiche nelle Ascidie. Boll. Zool. 17 1950 pp. 86–88.
- 49.—Minganti, A. & Reverberi, G. La distribuzione delle potenze nel germe di Ascidie allo stadio di otto blastomeri, analizzata mediante le combinazioni e i trapianti di blastomeri. Pubbl. Staz. zool. Napoli 21 (1) 1947 pp. 1–35 19 figs.

Minganti, A. see Reverberi, G.

**50.—Monné**, L. Über Farben und Farbenveränderungen lebenden Zellen im Dunkelfeld. Protoplasma **36** (2) 1941. [Tunicates p. 228].

Moon, H. P. see Haywood, C. A.

- 51.—Morton, J. E. The occurrence in New Zealand of the Enteropneust, Balanoglossus australiensis (Hill). Trans. roy. Soc. N.Z. 78 (4) 1950 pp. 464-466 l pl.
  - Muirhead, N. G. see Johnston, T. H.
- **52.—Müller,** H. W. Das Lanzett-fischchen als primitives Wirbeltier. Mikrokosmos, Stuttgart **39** (8) 1950 pp. 172–174 2 figs.
- 53.—Nair, R. V. The Thaliacea of the Madras plankton. Bull. Madras Govt. Mus. N.S. Nat. Hist. Sect. 6 (1) 1949 pp. 1-51 6 pls., tables.
- 54.—Navarro Candido, A. Clasificación de los animales. Madrid, 1949. [Protochordates pp. 203–208].
- **55.—Oliveira,** L. de. Levantamento biogeográfico de Baia de Guanabara. Mem. Inst. Osw. Cruz. **48** 1950. [Tunicates p. 374].
- **56.—0(rkin)**, P. A., 1950. *The Tunicata*, By N. J. Berrill. (Review). Scottish Nat. **62** No. 3 p. 188.
- 57.—Pérés, J.-M. Notes de biométrie cellulaire sur le sang, le conjonctif et la tunique d'une Ascidie Aplousobranche. Ann. Soc. 2001. Belg. 77 1947 pp. 56-67, 6 figs.
- 58.—Pérès, J. Notes sommaires sur le peuplement ascidiologique de la sous-region mauritanienne. C.R. Soc. Biogéographie, Paris 26 222–224 1949 pp. 3–5.
- 59.—Pérès, J.-M. Effets de l'ovariotomie sur la gonade de Ciona intestinalis
  (L.) C.R. Acad. Sci. Paris 230 1950 pp. 1796–1798.
- 60.—Pérès, J.-M. & Picard, J. Notes sommaires sur le peuplement des grottes sous-marines de la region de Marseille. C.R. Soc. Biogéogr. Paris No. 227 1949 pp. 42-45.

Picard, J. see Pérès, J.-M.

- 61.—Pisanò, A. Capacità di sviluppo dei primi due blastomeri dell' uovo di Ascidia in condizioni die espianto. Bol. Soc. ital. Biol. sper. 25 (8) 1949 pp. 1177–1179.
- 62.—Purasjoki, K. J. Plankton gesammelt in den Jahren 1889–1910 an den Küsten Finnlands. Finnl. hydrogr.-biol, Untersuch. No. 11 1947. [Tunicates p. 29].

- 63.—Redikorzev, V. A new species of Ascidia Aplausobranchiata from the Riu-Kiu Islands. Trans. Pacif. Comm. Leningr. No. 1 1930 pp. 157-158 2 figs.
- 64.—Reverberi, G. & Minganti, A. Le potenze dei quartetti animale e vegetativo isolati di Ascidiella aspersa. Pubbl. Staz. zool. Napoli 20 1947 pp. 135-149 24 figs.

Reverberi, G. see Minganti, A.

- 65.—Ricketts, E. F. & Calvin, J. Between Pacific Tides. Stanford, 1948 xxvii + 365 pp. pls. & figs.
- 66.—Sawaya, P. & Carvalho, J. de P. On the Branchiostoma [Amphioxus] of the coast of São Paulo. Bol. Fac. Filos. Cienc. let. Univ. S. Paulo Zool. 15 1950 pp. 235–237, 1 tab.
- 67.—Silén, L. On the nervous system of Glossobalanus marginatus Meek (Enteropneusta). Acta zool., Stockholm 31 1950 pp. 149–175 22 figs.
- 68.—Shinkin, L. On the structure of the somatic musculature of the lower Chordata. C.R. Acad. Sci. Moscou N.S. 70 (5) 1950 pp. 921-923 figs. [In Russian.]
- 69.—Smith, F. G. W., Williams, R. H. & Davis, C. C. An ecological survey of the subtropical inshore waters adjacent to Miami. Ecology 31 1950 pp. 119-146 7 figs., tables.

Sover, R. see Abrard, R.

- 70.—Sproston, N. G. A preliminary survey of the plankton of the Chu-san region, with a review of the relevant literature. Sinensia, Shanghai 20 (1-6) 1949. [Protochordates pp. 145-147].
- 71.—Tokioka, T. Contributions to Japanese Ascidian fauna. H. Notes on some ascidians collected chiefly along the coast of Kii Peninsula. Publ. Seto mar. biol. Lab. 1 (2) 1949 pp. 39–64 1 pl. 16 figs.
- 72.—Tokioka, T. Ascidians from the Palao Islands. I. Publ. Seto Mar. biol. Lab. 1 (3) 1950 pp. 115–150 2 pls. 23 figs.
- 73.—Tokioka, T. Droplets from the Plankton Net. VI. Notes on the posterior protuberance found in some fritillarians. Publ. Seto Mar. biol. Lab. 1 (3) 1950 pp. 153–155 2 figs.

- 74.—Ubisch, L. von. Weitere Untersuchungen über Regulation und Determination im Ascidienkeim. Roux Arch. Entw. Mech. Organ. 140 1940 pp. 1-24 17 figs.
- 75.—Ushakov, P. V. Abyssal fauna of the Okhotsk Sea. C.R. Acad. Sci. Moscou N.S. 71 (5) 1950 pp. 971-974. [In Russian].
- 76.—Vandebroek, G. Phénomènes d'induction et de compétence chez l'embryon d'ascidie. C.R. 13e Congr. int. Zool. Paris 1948 [1949] pp. 253-258.
- 77.—Vandebroek, G. Revision des classes et sous-classes de chordés inferieurs. C.R. 13e Congr. int. Zool. Paris 1948 [1949] pp. 281-282.

Williams, R. H. see Smith, F. G. W. Wood, E. J. F. see Allan, F. E.

78.—Zirpolo, G. Studi sui rapporti fra anomalia e rigenerazione. 3. La doppia rigenerazione inversa in *Ciona* intestinalis L. Arch. zool. Torino 35 1950 pp. 157–169 1 fig.

Yudkin, W. H. see Baldwin, E.

## II.—SUBJECT INDEX

#### GENERAL

Handbook of British Tunicates, BERRILL 10; Studies in Segmentation, BEMMELEN 7; Technique, GEIDIES 34.

#### PHYSIOLOGY

BALDWIN & YUDKIN 4; BELEYEVA 6; BERTRAND 11; CALIFANO & BAERI 18; CALIFANO & CASELLI 19; CARLISLE 21; DENNELL 26; HAYWOOD & MOON 36; KOBAYASHI 41, 42; MONNÉ 50; PÉRÈS 59; UBISCH 74; VANDEBROEK 76.

#### DEVELOPMENT

Berrill 8, 9; Breede 13; Brien & Breede 16; Colombo 23; Colwin & Colwin 24; Hirai 37, 38; Minganti & Reverberi 49; Pisanò 61; Reverberi & Minganti 64; Ubisch 74.

#### HYBRIDIZATION

MINGANTI 47, 48.

#### REGENERATION

BRIEN 15; ZIRPOLO 78.

#### ANATOMY

Ärnbäck-Christie-Linde 3; Jacobi 40; Silén 67; Shinkin 68; Tokioka 73.

#### FEEDING MECHANISMS

CARLISLE 20.

#### ECOLOGY

FISCHER-PIETTE & GAILLARD 30, 31; SMITH, WILLIAMS & DAVIS 69.

#### SYMBIOSIS, COMMENSALISM

BOURDILLON 12.

#### BIOMETRICS

PÉRÈS 57.

#### DISTRIBUTION MARINE

British Isles, Burdon-Jones 17; Fraser 33; Goodbody 35; Millar 46; Orkin 56; Finland, Purasjoki 62; Italy, Indelli 39; Mediterranean, Pérès & Picard 60; Morocco, Faure 29; Algeria, Dieuzeide 27; Black Sea, Dolgopolskaia 28; U.S.A. (Atlantic), Behre 5; W. Africa, Pérès 58; Indian Ocean, Chaoko 22; Kuriyan 43, 44; Nair 53; Riu-Kiu Islands, Redikorzev 63; Okhotsk Sea, Ushekov 75; China, Sproston 70; Japan, Tokioka 71; Palao Islands, Tokioka 72; California, Ricketts & Calvin 65; Australia, Allan & Wood 2; New Zealand, Brewin 14; Morton 51; Brazil, Marcus 45; Oliveira 55; Sawaya & Carvalho 66.

#### FOSSIL

Jurassic.—Abrard, Dollfuss & Sover 1.

#### III.—SYSTEMATIC INDEX

Modification of classification of Protochordates, Vandebroek 77.

#### TUNICATA

Of British Isles, structure, taxonomy, distribution, etc., BERRILL 10.

VOL. 87

Thaliacea of Scottish waters, Fraser 33; of Madras area, NAIR 53.

Aplidium polyglossum sp. n. Riu-Kiu Islands, Redikorzev Trans. Pacif. Comm. Leningrad 1 1930 p. 157 figs. 1-2.

Ascidia minuta sp. n. Palao Is., Tokioka Publ. Seto mar. biol. Lab. 1 (3) 1950 p. 129 pl. ix fig. 1 text-fig. 10.

Ascidiella aspersa, mechanics of blood system, HAYWOOD & MOON 36.

Botryllus schlosseri relations between structure of intestine and pyloric gland, Fouque 32.

Ciona intestinalis regeneration, ZIR-POLO 78.

Cyclosalpa bakeri, omitted from Berrill's monograph, ORKIN 56.

Cynthia roretai early development, HIRAI 37.

Didemnum gottschaldti sp. n. Palao Is., Токіока Publ. Seto mar. biol. Lab. 1 (3) 1950 p. 118 fig. 2.

Distaplia taylori sp. n, New Zealand, Brewin Trans. R. Soc. N.Z. 78 (2-3) 1950 p. 346 fig. 1.

Ecteinascidia hataii p. 127 fig. 9 (1-2), imperfecta p. 129 fig. 9 (3-4) spp. n. Palao Is., Токіока Publ. Seto mar. biol. Lab. 1 (3) 1950.

Eugyra novae-zealandiae sp. n. New Zealand, Brewin Trans. R. Soc. N.Z. 78 (2-3) 1950 p. 351 figs. 4-5.

Halocynthia simaensis sp. n. Japan, Токтока Publ. Seto mar. biol. Lab. 1 (2) 1949 p. 62 fig. 16.

Leptoclinum macrolobium sp. n. Japan, Токтока Publ. Seto mar. biol. Lab. 1 (2) 1949 p. 44 fig. 4.

Lissoclinum argyllense sp. n. Scotland, MILLAR J. Mar. biol. Ass. Plymouth 29 (2) 1950 pp. 389 fig. 1.

Polycarpa simplex p. 138 fig. 15, iwayamae p. 143 fig. 18, palaoensis p. 143 fig. 19 spp. n. Palao Is., TOKIOKA Publ. Seto mar. biol. Lab. 1 (3) 1950.

Pseudodistoma antinboja sp. n. Japan, Токіока Publ. Seto mar. biol. Lab. 1 (2) 1949 p. 39 pl. vi fig. 1 text-fig. 1.

Pyrosoma budding, BERRILL 8.

Pyura masuii p. 57 fig. 12, shiinoi p. 59 fig. 14 spp. n. michaelseni depressa p. 56 pl. vi fig. 4 text-fig. 11 var. n. Japan, Токіока Publ. Seto mar. biol. Lab. 1 (2) 1949; P. curvigona sp. n. Palao Is., Токіока Publ. Seto mar. biol. Lab. 1 (3) 1950 p. 147 pl. x figs. 4-6 text-fig. 22; P. savignyi ecology, FISCHER-PLETTE & GAILLARD 30.

Ritterella yamazii sp. n. Japan, Токтока Publ. Seto mar. biol. Lab. 1 (2) 1949 p. 41 fig. 2.

Salpa africana-maxima feeding mechanism, Carlisle 20; Salpa budding, Berrill 9.

Symplegma connectans sp. n. Japan, Токтока Publ. Seto mar, biol. Lab. 1 (2) 1949 p. 51 fig. 8.

Syndiazona grandis discoides var. n. Japan, Токтока Publ. Seto mar. biol. Lab. 1 (2) 1949 p. 48 fig. 6.

Tylobranchion structure, ÄRNBÄCK-CHRISTIE-LINDE 3.

#### HEMICHORDATA

Protochordata

Balanoglossus australiensis in New Zealand, Morton 51.

Saccoglossus pygmaeus structure, Jacobi 40.

#### CEPHALOCHORDATA

Branchiostoma lanceolata as a primitive vertebrate, Müller 52; B. platae, SAWAYA & CARVALHO 66; B. bermudae, feeding, DENNELL 26.

#### PTEROBRANCHIA

†Cephalodiscus supposed fossil tubes, Abrard, Dollfuss & Soyer 1.

Phoronida

Phoronis ovalis, Marcus 45.

Pognophora (Vacant.)

GRAPTOLITES (Vacant.)